Aug. 3, 1965 J. BERTELS 3,198,482

SLIDING GATE VALVE SECTOR-TYPE STORAGE TANK CLOSURE

Filed Jan. 29, 1962 3 Sheets-Sheet 1

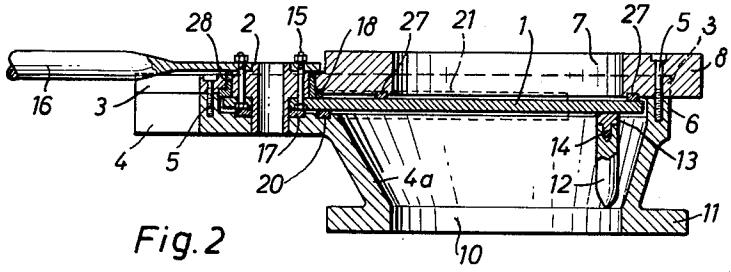


Fig. 2

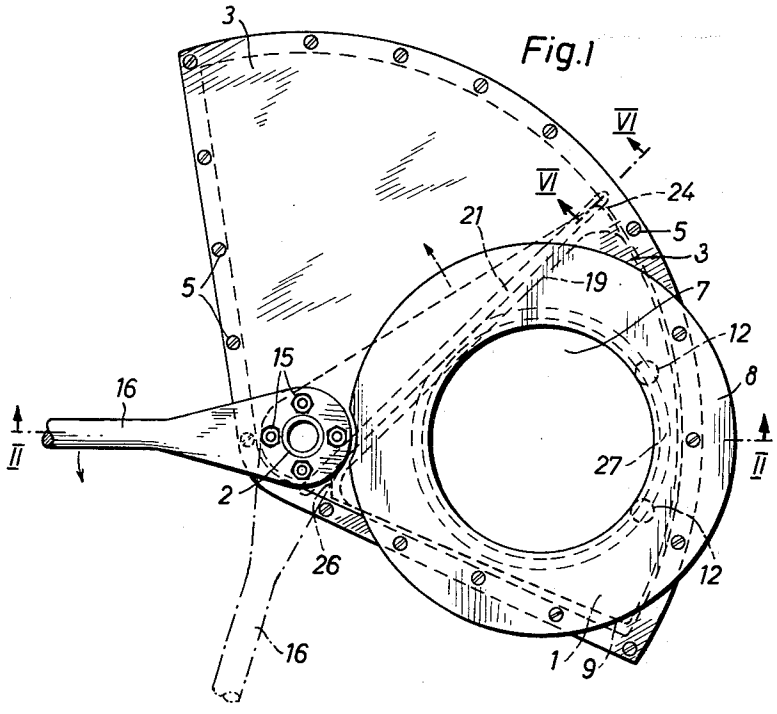


Fig. 1

Josef Bertels
INVENTOR

BY Wolfe & Wolfe
Attorneys

Aug. 3, 1965 J. BERTELS 3,198,482

SLIDING GATE VALVE SECTOR-TYPE STORAGE TANK CLOSURE

Filed Jan. 29, 1962 3 Sheets-Sheet 2

Fig. 3

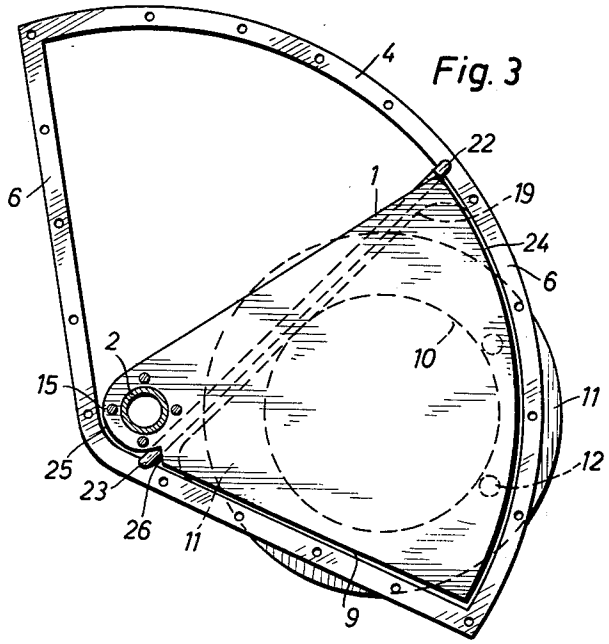
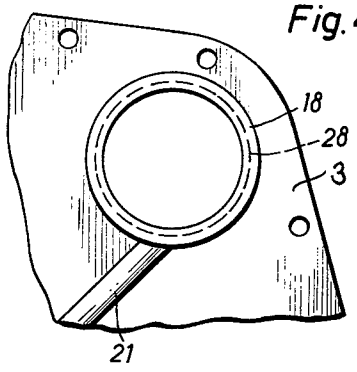


Fig. 4



Josef Bertels
INVENTOR

BY Nolte & Nolte
Attorneys

Aug. 3, 1965 J. BERTELS 3,198,482

SLIDING GATE VALVE SECTOR-TYPE STORAGE TANK CLOSURE

Filed Jan. 29, 1962 3 Sheets-Sheet 3

Fig. 5

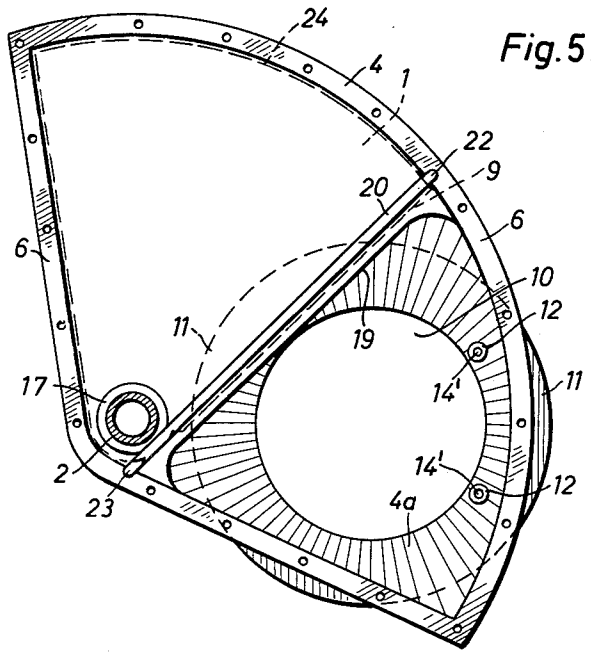
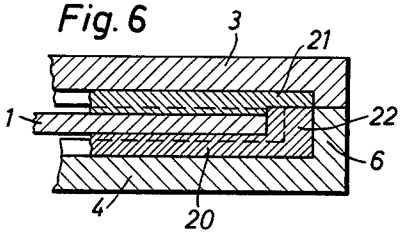


Fig. 6



Josef Bertels
INVENTOR

BY Nolte & Nolte
Attorneys

United States Patent Office 3,198,482 Patented Aug. 3, 1965

3,198,482

SLIDING GATE VALVE SECTOR-TYPE STORAGE TANK CLOSURE

Josef Bertels, Sternenstrasse 17, Berzdorf, near Bruhl, Germany

Filed Jan. 29, 1962, Ser. No. 169,559
Claims priority, application Germany, Feb. 1, 1961, B 61,090
6 Claims. (Cl. 251—302)

The present invention relates to storage-tank closures, and more particularly to horizontally arranged, sector-shaped closures swingable around a vertical axis.

There are known devices of this kind, installed in a bottom portion of storage tanks, bins or the like, adapted to hold granular or other pourable materials, in which the sector-shaped slide plate is guided in a casing of approximately double the width of the slide plate itself. The casing consists of a flat upper part provided with an intake opening for the material stored in the storage tank, and of a similarly flat lower part, and having a centrally disposed material outlet opening below the intake opening. With such a type of storage tank closure it happens that dust raised from the material being discharged settles around the outlet opening on the lower part of the casing. The dust deposit can cause the slide plate to jam during the closing procedure, especially if the dust is sticky, or if it compresses or cakes easily.

It is the object of the invention to provide a sector-shaped storage-tank closure of the above-described type, but improved in such a manner that dust deposits on the lower casing part are avoided with certainty even in the case of materials having pronounced dust-forming properties, while the slide plate is nevertheless securely guided in the casing.

According to one of the major features of the invention, this is accomplished by having that portion of the lower casing part which is covered by the slide plate when in its open position, and by the side walls of the casing, form a funnel-shaped transition to the outlet opening, and by having one or more projections disposed on the side of the outlet opening opposite the slide plate, these projections terminating at the level of the underside of the slide plate.

On the one hand, this insures in a simple manner that, thanks to the funnel-shaped structure of the lower casing part, the dust raised from the discharged material and settling outside the casing slides downward on the sloping sides of the funnel and is carried from all sides toward the outlet opening. On the other hand, the projections assure good guidance for the slide plate during the closing process and support it once it is closed.

According to another novel feature of the invention, the upper surfaces of the projections are made of a material having good anti-friction characteristics, assuring thereby that the slide plate moves easily over the projections during opening and closing.

According to a further development of the inventive storage-tank closure, the slide plate is guided along the funnel edge, sealed by the plate when in its open position, by a pair of annular strips arranged in the slide plate casing so that they slightly protrude above the inner surface of the casing and are made of a material having a low friction coefficient. The provision of the strips offers a slide-fit guidance for the slide plate, allows the latter to move easily in either direction, and assures that the casing space provided for the closed slide plate is effectively sealed against dust while the plate is moved to the open position.

Other objects and many of the attendant advantages of the invention will be readily appreciated as the same becomes better understood by reference to the following

detailed description, when considered with the accompanying drawings, wherein

FIG. 1 is a top plan view of the sector-type storage-tank closure according to the invention;

FIG. 2 is a sectional view of the closure taken along line II—II of FIG. 1;

FIG. 3 is a top plan view similar to that of FIG. 1, but with the upper part of the slide plate casing removed;

FIG. 4 is a partial view of the upper casing part, as seen from below;

FIG. 5 is a top plan view of the lower part of the casing; and

FIG. 6 is an enlarged sectional view taken along line VI—VI of FIG. 1.

The storage-tank closure shown in the drawings has a sector-shaped closing plate 1 made, for instance, of steel, rotatable around a pivot 2 and guided in a casing consisting of an upper part 3 and a lower part 4. The casing itself is sector-shaped and is approximately of double the width of the plate 1. The arrangement is such that one-half of the casing (toward the right-hand side of FIGS. 1, 3 and 5) receives the plate 1 when in its closed position, as shown in FIGS. 1–3, while the other half (toward the left in said figures) holds it when in the open position, as shown in broken lines in FIG. 5.

The upper part 3 of the casing is attached around the upwardly directed edge 6 of the lower casing part 4 with the aid of screws 5, making the joint dust-proof, and is provided with an inlet opening 7 for the granular or similar material stored in and to be discharged from the tank; this inlet is surrounded by a flange 8. By means of this flange, the casing is attached to the bottom or the discharge flange (not shown) of the tank or similar container. The lower part 4 of the casing is in the shape of a funnel 4a in the area flanked by the edge 9 of the plate 1, if in the open position, and by the inner casing edge 6 (FIG. 5). Part 4 ends in a discharge opening 10 for the material stored in the tank, disposed centrally below the inlet 7 and likewise surrounded by a flange 11 so that a pipe (not shown) for guiding the discharge material may be connected to it, which leads to the place of use or further storage.

Within the funnel-shaped lower part 4a of the casing two cylindrical projections 12 are disposed vertically in relation to the substantially horizontal plane of movement of the plate 1 and arranged on that side of the opening 10 which is opposite to the plate 1. Each projection 12 may carry a cap 13 made of brass or similar suitable material, this cap coming into contact with the underside of the plate 1. To provide secure anchorage for these caps 13, pins 14 are provided for them which enter into appropriate bores 14' in the projections 12 (FIG. 5).

The pivot 2 of the plate 1 is pivotally mounted in the casing on one side of the inlet opening 7 or of the flange 8. By means of four screws 15, aranged concentrically and symmetrically with respect to the pivot 2, the plate 1 is interconnected with a handle 16 which protrudes sidewise from the closure. Owing to this arrangement of the pivot 2, the angle at which the handle is swivelled during the opening and closing of the slide plate 1 is kept small; in the preferred embodiment here illustrated, the angle is only approximately 60°. The symmetrical arrangment of the screws 15 has the advantage that by readjusting the handle 16 with the screws, one can easily change the respective position of the handle and plate, to provide the best possible access in any given mounting position of the closure on the tank or the like.

The plate 1 is arranged on the pivot 2 with a sliding fit between two annular sealing plates 17, 18 made of brass, for example, which surround the pivot concentrically and are counter sunk into the lower and the upper casing parts 4 and 3, respectively, in a manner as to

project slightly above the inner surfaces of these parts. Along the edge 19 of the funnel 4a with which it may overlap when in the open position, the plate 1 is arranged with a sliding fit between sealing strip members 20, 21 which are preferably also made of brass and are countersunk into the respective lower and upper casing parts so that they protrude into the inside of the casing at the same height as the plates 17, 18. By having the plate 1 guided on the one hand between the plates 17, 18 and on the other hand between strip members 20, 21, the advantage is achieved that the plate does not come into direct contact with the inner surfaces of the casing parts. Thus these surfaces may be left unmachined or unfinished.

The lower strip member 20 is preferably provided at its ends with upwardly directed projections 22, 23 which, on their upper sides, come into close contact with the upper strip member 21 and with the upper annular plate 18. On their insides, these projections 22, 23 are in close contact with the edge of the slide plate 1, with very little clearance, and are shaped as to be adapted to rounded-off portions 24, 25, respectively of the plate 1 (FIGS. 1 and 3). In this way the slide plate is enclosed on all sides by tightly-fitting strips and members and that part of the plate casing which receives the plate when it is in the open position is sealed against any access of dust. To eliminate the possibility of the slide plate 1 hitting the projection 23 with its edge 9, the latter is provided with a notch 26 in the proximity of pivot 2; one side of the notch follows the rounded-off edge 25 of plate 1 to an extent that the plate can be completely closed.

In the closed position, the plate 1 lies on strip member 20 and on the projections 12 and is thus well supported against the weight of the contents of the tank resting on it. As shown in FIG. 3, the dimensions of the plate 1 are chosen in such a way that when it is closed the strip members 20, 21 still completely enclose the same. This also prevents dust rising from below from penetrating into the casing portion into which the plate 1 is withdrawn when the aligned openings 7, 10 are unobstructed or open. In order that the discharge flange of the tank, in the proximity of the inlet opening 7 of the closure, be securely sealed when the plate 1 is in the closed position, the opening 7 is surrounded by a brass ring 27 which makes a sliding contact with the plate 1.

All elements between which the slide plate 1 is guided with a sliding fit, i.e. the annular sealing plates 17, 18, the sealing strip members 20, 21, as well as the ring 27 and the caps 13 of the projections 12 are made of brass so that the plate 1 can be easily moved back and forth. It is understood, however, that these parts may also be made from another material, e.g. plastic, having good antifriction properties in conjunction with the slide plate. To further ease the swinging movement of the slide plate, the pivot 2 is preferably mounted in a sleeve 28 of brass (FIG. 4) or of other material which offers low frictional resistance to the pivot.

The pulverulent, granular or otherwise pourable material which emerges from the tank when the plate 1 is opened passes through the closure casing toward the opening 10 and may be simply discharged or led away by way of a pipeline (not shown) connectable to said opening at the flange 11.

Thanks to the fact that the portion 4a of the lower casing part 4 between the edge 9 of the plate 1, when open, and the casing edge 6 is funnel-shaped and tapers toward the opening 10, it is ensured that dust raised from the material during its discharge and necessarily collecting

inside the casing slides down the sloping sides of the funnel and travels toward the opening 10. The novel and inventive structure of the lower casing part offers the advantage that no dust can accumulate on it anywhere which could lead to a jamming of the slide plate.

It should be understood, of course, that the foregoing disclosure relates only to a preferred embodiment of the invention and it is intended to cover all changes and modifications of the example described which do not constitute departures from the spirit and scope of the invention as set forth in the appended claims.

I claim:

1. A sector-type storage-tank closure comprising a casing having an upper, an intermediate and a lower portion, said intermediate portion being at least partly wider than the other portions, a sector-shaped solid slide plate swingable between said upper and said intermediate portions and having an open and a closed position, seat means slidably contacted by said plate and engaging said plate when the latter is in its closed position, pivot means for laterally shifting said plate, an inlet opening in said upper portion and a discharge opening in said lower portion substantially aligned with said inlet opening, said intermediate portion sloping inwardly from the edges of said plate toward said discharge opening in said closed plate position, and said intermediate portion defining, where it slopes inwardly, at least part of the flow path through the closure, at least one projection on said intermediate portion substantially perpendicular with respect to the plane of said plate and providing therefor a sliding support, and elongated sealing members respectively engaging opposed faces of said plate and situated in a central region of said casing substantially midway between said open and said closed plate positions.

2. A closure according to claim 1, wherein said projection has the shape of a finger the end of which, contacted by said slide during its movement between said open and said closed positions, is made from a material offering a low frictional coefficient.

3. A closure according to claim 1, and wherein said seat means includes an annular sealing member in direct contact with and between said slide plate and at least one of said upper and said intermediate portions, said sealing member having good anti-friction characteristics.

4. A closure according to claim 1, further comprising handle means removably attachable to said plate in the region of said pivot means.

5. A closure according to claim 4, further comprising fastening means concentrically and symmetrically arranged with respect to said pivot means for the attachment of said handle means to said plate.

6. A closure according to claim 1, wherein said casing has approximately twice the width of said plate, said inlet and said discharge openings being arranged in one half of said width, said plate registering in said closed position with said openings in said one half while it is lodged in said open position within the other half of the casing width.

References Cited by the Examiner

UNITED STATES PATENTS

1,617,503	2/27	Seymour et al.	251—302 XR
2,656,280	1/28	Lalor	251—302
3,047,006	7/62	Transeau	251—301 XR

ISADOR WEIL, *Primary Examiner.*